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#### **ABSTRACT OF THE DISCLOSURE**

Disclosed are processes for the recovery and purification of higher diamondoids from a hydrocarbonaceous feedstock. Specifically disclosed is a multi-step recovery process for obtaining diamondoid compositions enhanced in tetramantane components and higher diamondoid components. Also disclosed are compositions comprising at least about 10 weight percent of non-ionized tetramantane components and higher diamondoid components and at least about 0.5 weight percent of non-ionized pentamantane components and higher diamondoid components based on the total weight of diamondoid components present.